

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
RESEARCH AND TECHNOLOGY RESUME

TITLE

Atmospheric and Surface Compositional Studies of Mercury and the Moon.

PERFORMING ORGANIZATION

Space Science Branch
Solar System Exploration Division
Space and Life Sciences Directorate
NASA Johnson Space Center, Houston, TX 77058

INVESTIGATOR'S NAME

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DESCRIPTION (a. Brief statement on strategy of investigation; b. Progress and accomplishments of prior year; c. What will be accomplished this year, as well as how and why; and d. Summary bibliography)

a. Strategy of Investigation: The atmosphere of the Moon and Mercury will be studied by means of high resolution spectroscopy of sodium and potassium resonance line emissions. The variation of metal vapor abundances with time, and with location will be measured with a view to understanding the origin and evolution of these elements in the atmospheres of the Moon and Mercury. Infrared spectroscopic measurements will be made of Mercury to determine the surface mineralogy, predicated on the availability of the Kuiper Airborne Observatory and the KPNO infrared CCD array.

b. Prior Accomplishments: During the past year, an excellent series of measurements were completed of the spatial distribution of sodium on Mercury. Sodium was found to be concentrated at the polar regions, and to be displaced towards the terminator by solar radiation pressure. Sodium and potassium were discovered in the atmosphere of the Moon. The ratio of sodium to potassium approximates that of the lunar regolith. Thermal infrared measurements of Mercury showed that the Christiansen peak was located shortwards of 8 microns, which indicates an acidic mineralogy.

c. Planned Accomplishments: The sodium and potassium atmospheres of the Moon will be mapped. The variation of scale height and abundance as a function of latitude and longitude relative to the subsolar point will be measured to the extent possible with telescope time made available for this purpose. Work will continue on measurement of the abundance and spatial distribution of the sodium and potassium atmosphere of Mercury. Infrared measurements of Mercury in the 6-8 micron region and the 2-4 micron region will be done, predicated on the availability of instrumentation needed for these measurements

d. Summary Bibliography:

Potter, A. E., and Morgan, T. H. 1987, "Variation of Sodium on Mercury with Solar Radiation Pressure," Icarus, 71, 472.

Morgan, T. H., Zook, H. A., and Potter, A. E. 1988, "Impact Driven Supply of Sodium and Potassium to the atmosphere of Mercury", Icarus, 74, to appear.

Hunten, D. M., Morgan, T. H., and Shemansky, D. E. 1988, "Atmosphere of Mercury" In Mercury (C. Chapman and F. Vilas Eds.) University of Arizona Press, Tucson (to be pub.)

Morgan, T. H., Zook, H. A. and Potter, A. E. 1988, "Production of Sodium and Potassium from the Lunar Regolith", Lun. Plan. Sci. Conf. XIX, 806-807

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